

## TABLE OF CONTENTS

PQS USER'S GUIDE	. . . . .
DEFINITIONS OF WORDS USED IN PQS	. . . . .
CONTRIBUTING FLEET PERSONNEL	. . . . .
ENLISTED SURFACE WARFARE SPECIALIST (ESWS) CROSS-REFERENCE	. . . . .
FUNDAMENTALS AND SYSTEMS SUMMARY	. . . . .
FUNDAMENTALS	
9101	Mechanical . . . . .
9102	Basic Hydraulics . . . . .
9103	Diesel Engine . . . . .
9104	Air-Conditioning and Refrigeration . . . . .
9105	Engineering Administration . . . . .
9106	Safety Precautions . . . . .
SYSTEMS	
9201	Ship's Whistle . . . . .
9202	Warping Capstan . . . . .
9203	Anchor Windlass . . . . .
9204	Package Conveyor . . . . .
9205	JP-5 Service and Transfer . . . . .
9206	Firemain . . . . .
9207	Gravity Davits . . . . .
9208	High-Pressure (HP) Air . . . . .
9209	Low-Pressure (LP) Air . . . . .
9210	Electrohydraulic Steering Gear . . . . .
9211	Westerbeke 4-107 Diesel Engine . . . . .
9212	General Motors 6-71 Small Boat Engine . . . . .
9213	Emergency Diesel Generator . . . . .
9214	R-12 Ship's Stores Refrigeration Plant . . . . .
9215	R-12 Air-Conditioning Plant (75-Ton Capacity) . . . . .
9216	Main Drainage . . . . .
9217	Shore Steam . . . . .
9218	Chilled Water . . . . .
QUALIFICATION SECTION	
WATCHSTATIONS	

## ENGINEERING PQS USER'S GUIDE

This guide will explain the Personnel Qualification Standards (PQS) program, what it is, and how to use it.

### WHAT IS PQS?

PQS is a part of your Command's overall training program. It provides minimum requirements to qualify on a Watchstation/Workstation. It is a means for the commanding officer and enlisted personnel in certain assigned duties. It will assist you in becoming a more productive member of the "combat-ready" Navy team."

### WHAT MAKES UP THE PQS PROGRAM?

The PQS program consists of the Standard booklet and the Progress Chart.

A. The Standard booklet contains questions you must be able to answer. It lists the performance items you must be able to do in order to qualify for a particular Watchstation/Workstation. Standards are written by naval personnel after asking themselves, "What do I need to know to do the job properly?"

The Standard booklet is made up of the following parts:

1. TABLE OF CONTENTS
2. USER'S GUIDE
3. DEFINITIONS OF WORDS USED IN PQS
4. CONTRIBUTING FLEET PERSONNEL
5. ENLISTED SURFACE WARFARE SPECIALIST (ESWS) CROSS-REFERENCE
6. FUNDAMENTALS AND SYSTEMS SUMMARY
7. FUNDAMENTALS (100 SECTION)
8. SYSTEMS (200 SECTION)
9. QUALIFICATION SECTION
10. WATCHSTATIONS/WORKSTATIONS (300 SECTION)
11. FEEDBACK FORM (CHANGE REQUEST)

B. The Progress Chart is used to display all the Standards in progress. It shows which Standards have been completed by your division or work center. Your division or work center uses the progress chart to determine who is qualified to stand the watches. It also helps you to perform the tasks required by your division. You should check the progress chart periodically to make sure all of the Standards you have completed have been recorded.

### PQS FORMAT

A. The numbers in PQS follow a definite pattern. The following breakdown of the numbering system is a handy key to PQS format:

<u>ject</u>	<u>1st Digit</u>	<u>2nd thru 4th Digit</u>
Engineering	7 = Main Propulsion	100 section = Fundamentals
	8 = Electrical	200 section = Systems

four-digit number.

Example: 9202

- 9 - Indicates qualification area (9 = Auxiliary)
- 202 - Indicates section 2 (System section) and that it is the second System

In the systems section of your Standard booklet, you may find a form such as the following example. For item .21 you must answer questions A, B and C. For item .22 only questions A and B are required. If there is no question mark, all questions must be answered.

## 9202.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?

.21 Capstan head  
.22 Capstan reducer

A	B	C
X	X	X
X	X	

## C. Qualification Group Numbering System

The Watchstation/Workstation section (300) is divided into qualification groups. Your book may be used for more than one final qualification such as 1052 Class Duty Auxiliaryman, etc. Each group is indicated on a Final Qualification Sign-Off page as follows:

Example: NAVEDTRA 43112-9BQ1

- 43112 - Indicates NAVEDTRA number assigned to the PQS package
- 9 - Indicates Auxiliary
- B - Indicates second revision
- Q1 - Indicates the first qualification group

1. FUNDAMENTALS (100 Section) This section identifies basic knowledge needed to do the job properly. Normally you would have acquired this knowledge during the school phase of your training. If you have not been to school, the requirements are outlined and the references listed will aid you in a self-study program.

2. SYSTEMS (200 Section) In systems, the subject under discussion is broken down into functional sections that may be compared to the electrical system in your car. The components of the electrical system are scattered throughout your car, but taken all together they form the "electrical system". The same is true of the equipment you are studying aboard your ship. The components may not all be located in one place, but they still form a system.

3. WATCHSTATION/WORKSTATION (300 Section) This section contains procedures you need to know to properly perform your job. Watchstations are divided into final qualification "groups" (Qual 1, Qual 2, Qual 3) with each group containing the following:

a. Final Qualification sign-off page

Final record that is filed in your training jacket and recorded in your Service Record upon final qualification

b. Qualification Summary page

Record of completion of other PQS qualifications, and Watchstations/Workstations within a qualification group

c. Watchstations/Workstations (task sign-off pages)

Record of completion of performed tasks and instruction watches for each Watchstation/Workstation

## 7. HOW TO QUALIFY

A. Your division officer or work center supervisor will issue you a Standard booklet. Your supervisor will assign Watchstations/Workstations and set time limits (goals) for completing your qualification. Progress toward qualification will be monitored on the division/work center Progress Chart. The estimated completion time, shown on each Watchstation/Workstation, is only a recommendation and may be modified by your command. It indicates how long it will take the average sailor under normal conditions to complete the Watchstation/Workstation.

B. Open your Standard booklet to your assigned Watchstation/Workstation. At the beginning of the Watchstation/Workstation you will find a list of tasks that must be completed before starting your tasks. Standards may include Watchstations/Workstations other than the one on which you are working. You should concentrate on the prerequisites for the Watchstation/Workstation on which you have been assigned, do not delay your qualification by spending time on others.

C. Complete the Safety Precautions Fundamentals first, then the remaining required Fundamentals and Systems. Your supervisor may require you to complete these in a certain order, if not, the choice is up to you. If you do not know the answer to a question in the Standard booklet, look up the answer in one of the reference books listed. If you cannot find the answer in the reference books, ask your supervisor for help.

D. As you complete a Fundamental or System section, have the Qualification Officer sign your Fundamentals and Systems Summary page. When you have completed all prerequisites, you are ready to start the performance items for that Watchstation/Workstation. Report your completion of all requirements for that Watchstation/Workstation to your supervisor.

## V. THE SUPERVISOR

A. As a senior petty officer, you will be required to assign j personnel to complete specific Watchstations/Workstations in PQS. W do this, always look through the Standard booklet to determine other that should be completed before work is started on the required Watchstations or related Fundamentals and Systems. If you are assign than one Watchstation/Workstation or section to be completed, it is to specify which one should be completed first. The supervisor is an important part of the PQS program if it is to be successful. If you PQS with insight, you will find that PQS is a helpful tool that can your overall training plan. You will be responsible for the accurate and tailoring of PQS to fit your command's needs, as well as for the of appropriate feedback to the PQS Development Group (feedback forms in the back of each Standard booklet). You should provide motivation personnel by assigning goals, showing interest, and following the training progress. The supervisor is responsible for training and should be to update and maintain the progress chart. It is important that the be aware of who is and who is not progressing, as well as where coun individual instruction may be needed. A sample PQS progress chart can be found in the PQS Manager's Guide (NAVEDTRA 43100-1B). As a supervisor you should be totally familiar with the duties, responsibilities, and assignments of Qualification Petty Officers. Your PQS program cannot survive without planning and quality control.

B. The estimated completion time, shown at the beginning of each Watchstation/Workstation, is only a recommendation and may be modified by the command. It indicates how long it will take the average sailor under the conditions to complete each Watchstation/Workstation.

## VI. THE QUALIFICATION PETTY OFFICER

A. Selection as a Qualification Petty Officer means that you are one of the command's subject matter experts on those Fundamentals, Systems, Watchstations/Workstations assigned to you. PQS cannot be successful without you. Your job is to be totally knowledgeable in your assigned areas and to be yourself available to check off your trainees' achievements, and to make sure that a high-quality PQS program is maintained in your division.

B. Each Qualification Petty Officer should have a set of standards for the Watchstations/Workstations so that all trainees receive the same. If multiple signatures are required for a line item, it is preferable that one signature be placed on the line item each working day or one watch elapse between signatures. If the trainee does not know the correct answer, it is your responsibility to help find the answer in the reference material. This will speed up the process of qualification and will familiarize your trainees with the use of publications. Obviously this requires that you know where all the answers can be found.

C. As the Qualification Petty Officer you will be the most likely individual to discover discrepancies in the Standard booklet. Any discrepancies noted should be brought to the attention of your supervisor.

## DEFINITIONS OF WORDS USED IN PQS

IRCREW EVOLUTION - A grouping of aircrew tasks that measure performance in the course of a flight

COMPONENTS - Major units that make up a system when properly connected

COMPONENT PART - A major part of a component

CONTROL SIGNAL - A signal used to control electronic or mechanical devices

EMERGENCY - An event or series of events in progress that will cause damage to equipment or personnel unless immediate, timely, and corrective steps are taken

FUNCTIONAL LOCATION - The position of a component within a system - not necessarily the physical location

FUNDAMENTALS - Basic facts, theories, laws, or principles (100 Section in PQS)

INTERLOCK - A protective device to prevent the unsafe operation of equipment or to sequence the action of systems, components, or component parts

MAINTENANCE ACTION - A maintenance technician qualification that measures the ability to perform a designated task

NORMAL OPERATING VALUE - The point at which satisfactory performance may be expected

PARAMETER - A variable (temperature, pressure, flow rate, voltage, current, frequency, etc.) that must be indicated, monitored, checked, or sensed during operation or testing

PROTECTIVE FEATURE - A device designed to prevent damage or injury

SENSING POINT - The point in a system at which a signal may be detected

SETPOINT - The value of a parameter at which: (a) an alarm is set off, (b) operator action is required, (c) valves open or shut, (d) proper operation stops and damage may occur, or (e) the optimum value for normal operation

SYSTEMS - Groups of components that operate together to perform specific functions (200 Section in PQS)

SYSTEM INTERFACE - (a) How outside influences affect the operation of the system, or (b) How the operation of this system affects the operation of other systems or equipment



## CONTRIBUTING FLEET PERSONNEL

The following personnel, under the supervision of the PQS Development Team, made a significant contribution to the development of this PQS for the F-1091 Class Engineering (Auxiliary) (Qual 9B):

EN1	S. W. BENNETT	USS MILLER (FF-1091)
EN1	G. L. MEESTER	USS GRAY (FF-1054)
MM2	A. J. COVERT	USS MILLER (FF-1091)
MM2	R. LAPIERRE	USS GRAY (FF-1054)

ENLISTED SURFACE WARFARE SPECIALIST (ESWS)  
PQS CROSS-REFERENCE

Upon completion of this PQS, the requirements for the following line items in the ESWS PQS (NAVEDTRA 43390, Oct 1979) will be satisfied:

130, 131, 141, 142, 143, 144, 152, 153, 156 and 157

## FUNDAMENTALS AND SYSTEMS SUMMARY

### FUNDAMENTALS

	<u>SIGNATURE</u>
Mechanical	
Basic Hydraulics	
Diesel Engine	
Air-Conditioning and Refrigeration	
Engineering Administration	
Safety Precautions	

### SYSTEMS

Ship's Whistle	
Warping Capstan	
Anchor Windlass	
Package Conveyor	
JP-5 Service and Transfer	
Firemain	
Gravity Davits	
High-Pressure (HP) Air	
Low-Pressure (LP) Air	
Electrohydraulic Steering Gear	
Westerbeke 4-107 Diesel Engine	
General Motors 6-71 Small Boat Engine	
Emergency Diesel Generator	
R-12 Ship's Stores Refrigeration Plant	

SYSTEMS (CONT'D)

SIGNATURE

9216 Main Drainage

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9217 Shore Steam

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9218 Chilled Water

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References:

- a. Fireman (NAVEDTRA 10520)
- b. Blueprint Reading and Sketching (NAVEDTRA 10077)
- c. Machinist's Mate 3 & 2 (NAVEDTRA 10524)
- d. Engineman 3 & 2 (NAVEDTRA 10541)
- e. Naval Ships' Technical Manual, Chap 503  
(NAVSEA S9086-RH-STM-000)

1 Describe the following types of drawings:

- a. Blueprint
- b. Schematic
- c. Cross section
- d. Simple sketch

2 Identify the symbols for the following valves used in mechanical drawings and blueprints:

- a. Globe
- b. Gate
- c. Check
- d. Relief
- e. Reducing/regulating
- f. Unloading
- g. Safety
- h. Butterfly

3 Describe the applications of the following basic pumps:

- a. Centrifugal
- b. Rotary
- c. Jet
- d. Reciprocating
- e. Propeller

4 Describe the applications of the following valves:

- a. Gate
- b. Globe
- c. Unloading
- d. Reducing
- e. Relief
- f. Check
- g. Butterfly
- h. Regulating

## References:

- a. Engineman 3 & 2 (NAVEDTRA 10541)
- b. Fluid Power (NAVEDTRA 16193)
- c. Naval Ships' Technical Manual, Chap 556 (NAVSEA S9086)

- .1 Discuss the information contained in the following:
  - a. Pictorial diagram
  - b. Schematic diagram
  - c. Block diagram
- .2 List the manuals and instructions most frequently used by division.
- .3 Explain the applications of the following:
  - a. Reservoir
  - b. Pump
  - c. Tubing or piping
  - d. Control/selection valve
  - e. Actuating unit
- .4 Describe the various equipment that use hydraulics on board.
- .5 Describe the following pumps:
  - a. Axial piston
  - b. Vane
- .6 Discuss the principles of operation of a directional- or valve.

## References:

- a. Blueprint Reading and Sketching (NAVEDTRA 10077)
- b. Engineman 3 & 2 (NAVEDTRA 10541)
- c. Fireman (NAVEDTRA 10520)
- d. Naval Ships' Technical Manual, Chap 233 (NAVSEA S9086-HB-S)
- e. Naval Ships' Technical Manual, Chap 9150, Sect I, Art 9150 Art 9150.2.1.2 and Art 9150.2.1.3 (NAVSEA 0901-LP-150-0003)

- .1 State the functions of the following in relation to diesel eng
  - a. Block
  - b. Crankshaft
  - c. Connecting rods
  - d. Pistons
  - e. Camshaft
  - f. Intake/exhaust valves
  - g. Cylinder head
  - h. Fuel injection system
  - i. Blowers
  - j. Air starting system
- .2 Explain the sequence of events for one complete revolution of crankshaft of a two-cycle and a four-cycle internal combustion
- .3 Explain the protective functions of the following:
  - a. Gauge or thermometer
  - b. Speed-limiting governor
  - c. Overspeed governor/dump valve
  - d. Pyrometer
  - e. Blower shutdown
  - f. Remote fuel shutdown
  - g. Low lube oil alarms
- .4 Describe the use and the handling of the following materials:
  - a. JP-5
  - b. Lube oil
  - c. Water pump grease
  - d. All-purpose grease
- .5 Explain how many strokes/cycles are involved in engine operati

## References:

- a. Blueprint Reading and Sketching (NAVEDTRA 10077)
- b. Engineman 3 & 2 (NAVEDTRA 10541)
- c. Refrigeration and Air-Conditioning (NAVEDTRA 16163)

.1 Define the following terms as applied to refrigeration:

- a. Refrigeration ton
- b. Humidity
- c. Refrigerant
- d. Specific heat
- e. Latent heat of vaporization
- f. Latent heat of fusion
- g. Refrigerating effect
- h. Coefficient of performance (COP)
- i. Dewpoint
- j. Dry bulb temperature
- k. Wet bulb temperature
- l. Compression
- m. Expansion
- n. Evaporation
- o. Sensible heat
- p. Discharge temperature
- q. Condensing temperature
- r. Suction temperature
- s. Discharge pressure
- t. Suction pressure
- u. Evaporating temperature

.2 State the four phases of the refrigeration cycle.

.3 Explain how the following devices are used:

- a. Thermal-expansion valve (TXV)
- b. Evaporator
- c. Compressor
- d. Condenser
- e. Receiver

.4 Explain the functions of the following:

- a. Evaporator pressure-regulating (EPR) valve
- b. Low-pressure (LP) cutout switch
- c. High-pressure (HP) cutout switch
- d. Water failure cutout switch
- e. Relief valve
- f. Water-regulating valve (WRV)
- g. Strainers

## Reference:

- a. Engineering Administration (NAVEDTRA 10858)

.1 Locate and identify the following manuals:

- a. Engineering Department Organization and Regulations (EDORM)
- b. Engineering Casualty Control (ECC) Handbook
- c. Ship's Information Book

.2 Define the following terms:

- a. Watch, Quarter and Station Bill
- b. Work request
- c. Job order

.3 Explain the purpose of the following:

- a. Warmup/startup schedule
- b. Securing schedule
- c. Engineering Operational Sequencing System (EOSS)

.4 Explain the steps required to obtain permission to start major machinery in port.

## References:

- a. Accident Prevention Manual (OPNAVINST 5101.2)
- b. Engineman 3 & 2 (NAVEDTRA 10541)
- c. Naval Ships' Technical Manual, Chap 593 (NAVSEA S9086-1)
- d. Fireman (NAVEDTRA 10520)
- e. Machinist's Mate 3 & 2 (NAVEDTRA 10524)
- f. Navy Safety Precautions for Forces Afloat (OPNAVINST 5102.1)
- g. Accident Investigation and Reporting (OPNAVINST 5102.1)
- h. Standard Organization and Regulations of the U.S. Navy (OPNAVINST 3120.32)
- i. Naval Ships' Technical Manual, Chap 9590 (New 516) (NAVSEA 0901-LP-590-0002)

- .1 Describe where safety precautions are posted on machinery throughout the space.
- .2 Describe the following in terms of effect on or hazard to equipment:
  - a. Improper packing in pump
  - b. Improper packing in valve
  - c. Misuse of valves
  - d. Operation of turbine with a bowed shaft
  - e. Operation of turbine with broken blading
  - f. Improper valve alignment
- .3 Discuss the following in terms of safety in engineering space
  - a. Clothing and precautions to be observed when working at pressure and/or high-temperature fluids or equipment.
  - b. Precautions necessary when working near rotating machinery.
  - c. Personnel hazards associated with the release to the atmosphere of water above 212-degrees Fahrenheit.
  - d. Precautions to be observed when handling high-pressure and high-temperature fluids.
  - e. Precautions to be observed when entering a void or poorly ventilated space.
  - f. The purpose of flange flash guards.
  - g. The importance of bolted deck plates, gratings, and handrails.
  - h. The importance of good housekeeping practices in engineering spaces.
  - i. The hazards of oil in the bilges.
  - j. The special hazard involved when working with steam and piping.
  - k. Precautions to be observed when using portable electrical equipment.
  - l. Precautions to be observed when operating a hydraulic system.
  - m. Precautions to be observed when starting and operating an engine.
  - n. The importance of the tag-out logs, tag-out procedures, initiating and clearing of tags, and the audit aspects of the system.
  - o. The importance of hearing protection.

.4 Describe the safety precautions to be observed when using t

- a. Calcium hypochlorite
- b. Sodium chromate-disodium phosphate mixture
- c. Vacuum pump oil (tricresyl phosphate (TCP))

.5 Discuss the eight basic accident cause factors as defined in Accident Prevention Manual.

.6 Discuss the various kinds of accident investigations and how to conduct them.

.7 Discuss the kinds of reports required for personnel injuries, lost workdays, and material/property damage.

.8 Discuss the following as applied to refrigeration and air-conditioning equipment:

- a. Safety precautions to be observed when starting up the refrigeration plant.
- b. First-aid treatment for refrigerant burns.
- c. Safety precautions to be observed when using refrigerant metal or open flame.
- d. Safety precautions to be observed when handling refrigerant.
- e. Safety precautions to be observed when storing refrigerant.
- f. Protective equipment and clothing to be worn when charging refrigeration system.

.9 Explain the requirements for the following:

- a. Long-sleeved shirts
- b. Hats
- c. Goggles
- d. Gloves
- e. Steel-toed shoes
- f. Non-sparking tools for MOGAS system
- g. Hearing protection

.10 Explain the oily waste discharge limitations as they apply to board personnel.

.11 Describe the procedures used, communications established, and actions required in the event of an oil spill.



## SHIP'S WHISTLE SYSTEM

### References:

- a. Manufacturer's Technical Manual
- b. Machinist's Mate 3 & 2 (NAVEDTRA 10524)

01.1 What is the function of this system?

.11 Draw a diagram of this system showing all components listed below.  
.12 Refer to a standard print of this system or to the actual equipment.

01.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What protection is provided by it?
- F. What are the probable indications if this component fails?
- G. What are the positions and functions of each position?

	A	B	C	D	E	F	G
.21 Whistle body	X	X					
.22 Supply piping and valves	X	X					X
.23 Drain valves and piping	X	X					X
.24 Steam traps	X	X				X	X
.25 Control cables			X	X			X
.26 Solenoids			X	X	X	X	
.27 Operating lever and return spring	X	X			X	X	

01.3 PRINCIPLES OF OPERATION

.31 How do the components work together to achieve the system's function?

.32 Using a diagram of the system, show the path of:

- a. Steam from the reducer through the supply piping and valves to the whistle.
- b. Condensate from the whistle through the drain valves and piping to the deaerating feed tank (DFT)/low-pressure (LP) drain tank.

.33 What indications will you receive if the system is malfunctioning?

01.4 PARAMETERS

For the items listed answer the following questions:

9201.5 SYSTEM INTERFACE

.51 How do the following outside influences affect this

- a. Loss of 150 PSI steam pressure
- b. Operation of steam drains

9201.6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system

9202 WARPING CAPSTAN SYSTEM

References:

- a. Manufacturer's Technical Manual
- b. Ship's Information Book
- c. Machinist's Mate 3 & 2 (NAVEDTRA 10524)
- d. Naval Ships' Technical Manual, Chap 9250 (New 582) (NAVSEA 0901-LP-250-0001)

9202.1 What is the function of this system?

.11 Refer to a standard print of this system or to the actual equipment.

9202.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?
- H. What are the positions and functions of each position?

	A	B	C	D	E	F	G	H
.21 Capstan head	X	X	X					X
.22 Capstan reducer		X	X					X
.23 Motor	X	X	X	X	X	X	X	X

9202.3 PRINCIPLES OF OPERATION

.31 How do the components work together to achieve the system's purpose?

.32 What indications will you receive if the system is malfunctioning?

9202.4 PARAMETERS - None to be discussed.

9202.5 SYSTEM INTERFACE

.51 How does loss of electrical power supply affect this system?

9202.6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system?

9203

## ANCHOR WINDLASS SYSTEM

### References:

- a. Manufacturer's Technical Manual
- b. Naval Ships' Technical Manual, Chap 9250 (NAVSEA 0901-LP-250-0001)

9203.1 What is the function of this system?

.11 Refer to a standard print of this system or to the equipment.

9203.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?
- H. What are the positions and functions of each component?

	A	B	C	D	E	F
.21 Reducer assembly	X	X			X	X
.22 Main deck assembly		X	X			
.23 Handbrake control stand assembly		X	X			
.24 Capstan head		X	X			
.25 Electric motor and hand controller	X	X	X	X	X	X
.26 Wildcat assembly	X	X			X	X

9203.3 PRINCIPLES OF OPERATION

.31 How do the components work together to achieve the system's purpose?

.32 What indications will you receive if the system fails?

9203.4 PARAMETERS - None to be discussed.

9203.5 SYSTEM INTERFACE

.51 How does loss of electrical power supply affect the system?

9203.6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system?

9204 PACKAGE CONVEYOR SYSTEM

References:

- a. Manufacturer's Technical Manual
- b. Ship's Information Book
- c. Naval Ships' Technical Manual, Chap 9830 (New 589)  
(NAVSEA 0901-LP-830-0002)

9204.1 What is the function of this system?

.11 Refer to a standard print of this system or to the actual equipment.

9204.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What are the safety/protective devices?

	A	B	C
.21 Carrier guide arm	X	X	
.22 Carrier	X	X	X
.23 Carrier sprocket	X	X	X
.24 Drive chain	X	X	X
.25 Head shaft drive sprocket	X	X	X
.26 Overload slip clutch	X	X	X
.27 Gear reducer	X	X	X
.28 Friction disc	X	X	X
.29 Belleville spring	X	X	
.210 Brake	X	X	X

9204.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system
- .32 What indications will you receive if the system is malfunctioning?

9204.4 PARAMETERS

- .41 What is the load capacity (per tray)?

9204.5 SYSTEM INTERFACE

- .51 How does loss of electrical power affect this system?

9204.6 SAFETY PRECAUTIONS

9205

JP-5 SERVICE AND TRANSFER SYSTEM

## References:

- a. Manufacturer's Technical Manual
- b. Naval Ships' Technical Manual, Chap 9150 (New 542 (NAVSEA 0901-LP-150-0003) and Chap 9550 (New 541 (NAVSEA 0901-LP-550-0013)
- c. NWP 42, Rev E, para 4.5 thru 4.5.4

## 9205.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components
- .12 Refer to a standard print of this system or to the actual equipment.

9205.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?

	A	B	C	D	E	F	G
.21 Fuel filter separators	X	X		X	X	X	X
.22 Sight gauge assembly	X	X					X
.23 Differential-pressure gauges	X	X					X
.24 Transfer and service pump	X	X	X	X			
.25 Storage and service tanks	X	X					X
.26 Tank level indicators	X	X	X				
.27 Speed decreaser	X	X					X
.28 Tank sounding tube	X	X					X
.29 Diesel day tank	X	X					X

9205.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system's purpose?
- .32 Using a diagram of the system, show the path of:
  - a. JP-5 from the storage tanks to the service tanks.
  - b. JP-5 from the service tanks to the related equipment.
- .33 What indications will you receive if the system is malfunctioning?

9205.4 PARAMETERS (CONT'D)

- .41 Tank level
- .42 JP-5 inlet and outlet pressures
- .43 JP-5 system pressures
- .44 JP-5 filter separators/differential pressures
- .45 JP-5 system and pump relief valve pressures

9205.5 SYSTEM INTERFACE

- .51 How does this system interface with the following:
  - a. JP-5 refueling station
  - b. Emergency Diesel Generator System

9205.6 SAFETY PRECAUTIONS

- .61 What general safety precautions apply to this system?

9206

## FIREMAIN SYSTEM

### References:

- a. Manufacturer's Technical Manual
- b. Ship's Information Book, Vol II
- c. Engineman 3 & 2 (NAVEDTRA 10541)
- d. Naval Ships' Technical Manual, Chap 503 (NAVSEA S90)
- e. Damage Control Plate/Diagram 6

9206.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components listed
- .12 Refer to a standard print of this system or to the actual equipment.

9206.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?

- .21 Fire pumps
- .22 Suction and discharge valves and piping
- .23 Firemain risers
- .24 Fireplugs and marine strainers
- .25 Jumper stations
- .26 Cooling water reducers
- .27 Main and secondary drainage eductors
- .28 Firemain pressure gauges
- .29 Local and remote start and stop switches
- .210 Local and remote valves and reach rods
- .211 Vent and equalizing valves

9206.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system's purpose?
- .32 Using a diagram of the system, show the path of seawater from the pump suction to the riser.
- .33 What indications will you receive if the system is malfunctioning?

## 9206.4 PARAMETERS

For the items listed answer the following questions:

- A. What are the normal operating values and tolerances?
- B. Where are the parameters sensed or monitored?
- C. What is the physical location of the indicators?

- .41 Suction and discharge pressure
- .42 Firemain pressure
- .43 Firemain eductor pressure

## 9206.5 SYSTEM INTERFACE

- .51 How do the following outside influences affect this system:
  - a. Variations in cooling water pressure
  - b. Loss of electrical power supply
  - c. Clogged sea chest/strainer
- .52 How does this system interface with the following:
  - a. Auxiliary Cooling Water System
  - b. Flushing Water System

## 9206.6 SAFETY PRECAUTIONS

- .61 What general safety precautions apply to this system?
- .62 What special safety precautions apply to starting, operating, securing the fire pump?

9207 GRAVITY DAVITS SYSTEM

References:

- a. Manufacturer's Technical Manual
- b. Machinist's Mate 3 & 2 (NAVEDTRA 10524)
- c. Naval Ships' Technical Manual, Chap 9200 (New 571) (NAVSEA 0901-LP-200-0001)
- d. Navy Safety Precautions for Forces Afloat (OPNAVINST Chap 4, Sect I, Art 0402, para 4-1)

9207.1 What is the function of this system?

.11 Refer to a standard print of this system or to the actual equipment.

9207.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?

	A	B	C	D	E
.21 Trackway	X	X			X
.22 Davit head	X	X			X
.23 Winch	X	X	X	X	X
.24 Manual brake	X	X			

9207.3 PRINCIPLES OF OPERATION

.31 How do the components work together to achieve the system

.32 What indications will you receive if the system is malfun

9207.4 PARAMETERS - None to be discussed.

9207.5 SYSTEM INTERFACE

.51 How does loss of electrical power affect this system?

9207.6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system?

HIGH-PRESSURE (HP) AIR SYSTEM

## References:

- a. Manufacturer's Technical Manual
- b. Machinist's Mate 3 & 2 (NAVEDTRA 10524)
- c. Ship's Information Book
- d. Naval Ships' Technical Manual, Chap 9490 (New 551) (NAVSEA 0901-LP-490-0003)
- e. Navy Safety Precautions for Forces Afloat, Chap 3, Art 0342 (OPNAVINST 5100.19)

08.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components listed below.
- .12 Refer to a standard print of this system or to the actual equipment.

08.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?
- H. What are the interlocks?

	A	B	C	D	E
.21 Air flasks	X	X			
.22 Air flask inlet valves	X	X			
a. Microswitches	X	X			
.23 HP air header stop valve	X	X			
.24 Gun isolation valve (fore and aft)	X	X			
.25 Impulse chamber inlet valve	X	X			
.26 Impulse chamber	X	X			
.27 Impulse chamber outlet valve	X	X			
.28 Reducer inlet valve	X	X			
a. Microswitches	X	X			
.29 Reducer	X	X			
.210 Reducer outlet valve	X	X			
a. Microswitches	X	X			
.211 Reducer bypass valve	X	X			
.212 Ship's service air connection	X	X			
.213 Torpedo isolation valve	X	X			
.214 Torpedo charging and firing manifold	X	X			
.215 Impulse chamber drain valves	X	X			

## 9208.2 SYSTEM COMPONENTS AND COMPONENT PARTS (CONT'D)

- .222 Manual moisture separator
- .223 Temperature monitor
- .224 Seawater piping and valves
- .225 HP piping and valves
- .226 Cooling elements
- .227 Compressor first-stage relief valve
- .228 Compressor second-stage relief valve
- .229 Compressor third-stage relief valve
- .230 Compressor fourth-stage relief valve

## 9208.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system's purpose?
- .32 Using a diagram of the system, show the path of:
  - a. HP air from the compressor to gun mounts.
  - b. HP air from the compressor to the antisubmarine room.
  - c. HP air from the compressor to the torpedo tubes.
  - d. HP air from the compressor to the low-pressure (LP) tanks.
  - e. Seawater from the cooling water inlet valve to the outlet valve.
  - f. HP air from the compressor suction to the discharge line.
  - g. Oil from the lubricator to the compressor.

- .33 What indications will you receive if the system is malfunctioning?

## 9208.4 PARAMETERS

For the items listed answer the following questions:

- A. What are the normal operating values and tolerances?
- B. Where are the parameters sensed or monitored?
- C. What is the physical location of the indicators?
- D. What is the alarm setpoint?

- .41 Compressor discharge pressure
- .42 Air flask pressure
- .43 Reducer outlet pressure
- .44 Torpedo charging and firing manifold pressure
- .45 1st-stage through 4th-stage discharge pressure
- .46 Oil pressure
- .47 Cooling water pressure
- .48 Air accumulator pressure
- .49 1st-stage through 4th-stage temperatures
- .410 Oil temperature
- .411 Final air temperature
- .412 Lubricator flow rate

9208.5 SYSTEM INTERFACE

.51 How do the following outside influences affect this system?

- a. Charging and firing torpedoes
- b. Charging and firing guns
- c. Operation of ASROC snubbers
- d. Operation of emergency diesel generator
- e. Operation of Low-Pressure (LP) Air System
- f. Variations in Seawater Service System pressure
- g. Loss of 60-Hz power

.52 How does this system interface with the following:

- a. Gun System
- b. Torpedo System
- c. ASROC System
- d. Low-Pressure (LP) Air System
- e. Emergency Diesel Generator System
- f. Sonar dome

9208.6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system?

9209 LOW-PRESSURE (LP) AIR SYSTEM

References:

- a. Manufacturer's Technical Manual
- b. Engineman 3 & 2 (NAVEDTRA 91519)
- c. Naval Ships' Technical Manual, Chap 9490 (New 55)  
(NAVSEA 0901-LP-490-0003)
- d. Ship's Information Book

9209.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components
- .12 Refer to a standard print of this system or to the equipment.

9209.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?

	A	B	C	D	E	F	G
.21 Air receiver	X	X			X	X	X
.22 Air piping and valves	X	X			X	X	X
.23 Reducers	X	X					X
.24 Moisture separators	X	X			X	X	X
.25 Risers	X	X					X
.26 Inlet valve to air dryers	X	X					X
.27 Compressor	X	X	X	X			X
.28 Intercooler	X	X					X
.29 Aftercooler	X	X					X
.210 Dehydrator	X	X			X		
.211 Cooling water piping	X	X					X
.212 Gauges and thermometers	X	X					X
.213 LP air compressor controller	X	X					X
.214 Air cleaner	X	X					X
.215 Priority valve	X	X					X
.216 Relief valves	X	X					X

9209.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system's function?

9209.3 PRINCIPLES OF OPERATION (CONT'D)

.33 What indications will you receive if the system is malfunction

9209.4 PARAMETERS

For the items listed answer the following questions:

- A. What are the normal operating values and tolerances?
- B. Where are the parameters sensed or monitored?
- C. What is the physical location of the indicators?
- D. What is the alarm setpoint?

	A	B	C	D
.41 Compressor discharge pressure	X	X	X	X
.42 Air receiver pressure	X	X	X	X
.43 Pressure switch settings	X			
.44 Relief valve settings	X			
.45 Cooling water temperature	X	X	X	X
.46 Lube oil pressure	X	X	X	X
.47 Intercooler pressure/temperature	X	X	X	X
.48 Aftercooler pressure/temperature	X	X	X	X

9209.5 SYSTEM INTERFACE

.51 How do the following outside influences affect this system:

- a. Loss of 60-Hz power
- b. Loss of Seawater Service System

9209.6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system?

9210

ELECTROHYDRAULIC STEERING GEAR SYSTEM

References:

- a. Manufacturer's Technical Manual
- b. Engineman 3 & 2 (NAVEDTRA (91519)
- c. Ship's Information Book
- d. Naval Ships' Technical Manual, Chap 562 (NAV)

9210.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components.
- .12 Refer to a standard print of this system or to the equipment.

9210.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?
- H. What is the source of control signals?
- I. What are the positions and functions of each component?

- .21 Electrical control unit
- .22 Trick wheel
- .23 Emergency steering handwheel
- .24 Rachet assembly
- .25 Steering motor
- .26 Variable stroke pump
- .27 Service tank
- .28 Storage tank
- .29 Cylinder
- .210 Crosshead on rudder posts
- .211 Ram unit
- .212 Rudder angle indicator
- .213 Hand pump (fill and drain)
- .214 In-line valves (fill and drain/hand pump steering)
- .215 Pressure gauges

9210.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the desired steering effect?

### 9210.3 PRINCIPLES OF OPERATION (CONT'D)

.32 Using a diagram of the system, show the path of hydraulic fluid through:

- Variable stroke pump through the system and back to the pump
- Emergency hand pump through the system and back to the pump
- Storage tank through the fill and drain system to the service tanks.

.33 What indications will you receive if the system is malfunctioning?

### 9210.4 PARAMETERS

For the items listed answer the following questions:

- What are the normal operating values and tolerances?
- Where are the parameters sensed or monitored?
- What is the physical location of the indicators?

.41 Ram oil pressure

.42 Servo pressure

### 9210.5 SYSTEM INTERFACE

.51 How do the following outside influences affect this system:

- Loss of electrical power supply
- Loss of the Vent Cooling System

### 9210.6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system?

9211

## WESTERBEKE 4-107 DIESEL ENGINE SYSTEM

### References:

- a. Manufacturer's Technical Manual
- b. Engineman 3 & 2 (NAVEDTRA 91519)
- c. Naval Ships' Technical Manual, Chap 233 (NAVSEA S908)

9211.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components listed.
- .12 Refer to a standard print of this system or to the actual equipment.

9211.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following component and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?
- H. What is the source of control signals?
- I. What are the positions and functions of each position?

.21	Cylinder block	A
.22	Cylinder head/valve assembly	X
.23	Engine exhaust manifold	X
.24	Engine exhaust elbow	X
.25	Starter motor	X
.26	Lube oil pump	X
.27	Lube oil sump	X
.28	Lube oil filter	X
.29	Lube oil cooler	X
.210	Engine oil level dipstick	X
.211	Transmission	X
.212	Transmission oil level dipstick	X
.213	Heat exchanger	X
.214	Freshwater tank	X
.215	Cooling water lines (freshwater and seawater)	X
.216	Freshwater pump	X
.217	Seawater pump	X
.218	Primary fuel filter	X
.219	Fuel lift pump	X
.220	Secondary fuel filter	X

### 9211.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system
- .32 Using a diagram of the system, show the path of:
  - a. Fuel oil from the storage tank to the injector nozzles
  - b. Fuel oil from the injector nozzles to the storage tank
  - c. Seawater cooling from the pump through the heat exchanger overboard discharge.

- .33 What indications will you receive if the system is malfunctioning?

### 9211.4 PARAMETERS

For the items listed answer the following questions:

- A. What are the normal operating values and tolerances?
- B. Where are the parameters sensed or monitored?
- C. What is the physical location of the indicators?

- .41 Lube oil temperature
- .42 Lube oil pressure
- .43 Drive oil pressure
- .44 Freshwater temperature
- .45 Engine RPM
- .46 Battery charging current

### 9211.5 SYSTEM INTERFACE - None to be discussed.

### 9211.6 SAFETY PRECAUTIONS

- .61 What general safety precautions apply to this system?

9212

GENERAL MOTORS 6-71 SMALL BOAT ENGINE SYSTEM

## References:

- a. Manufacturer's Technical Manual
- b. Engineman 3 & 2 (NAVEDTRA 91519)
- c. Naval Ships' Technical Manual, Chap 233 (NAVSE)
- d. Navy Safety Precautions for Forces Afloat, Chap Sect III, Art 0430 (OPNAVINST 5100.19)

9212.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components
- .12 Refer to a standard print of this system or to the equipment.

9212.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?

		A	B	C	D	E	F	G
.21	Blower	X	X	X	X			X
.22	Cylinder block	X	X					X
.23	Cylinder head	X	X					X
.24	Air silencer	X	X			X	X	X
.25	Starting motor	X	X	X				X
.26	Governor	X	X	X	X	X	X	X
.27	Lube oil pump	X	X	X				X
.28	Lube oil filter	X	X					X
.29	Lube oil cooler	X	X					X
.210	Lube oil fill tube	X	X					X
.211	Engine oil level dipstick	X	X					
.212	Transmission	X	X	X	X			X
.213	Heat exchanger	X	X					X
.214	Freshwater pump	X	X	X				X
.215	Water manifold	X	X					X
.216	Thermostat	X	X					X
.217	Raw water (seawater) pump	X	X	X				X
.218	Seawater suction valve	X	X					X
.219	Fuel tank	X	X					X
.220	Fuel strainer	X	X					X
.221	Fuel pump	X	X	X				X

## .2 SYSTEM COMPONENTS AND COMPONENT PARTS (CONT'D)

	A	B	C	D	E	F	G
.228 Engine exhaust pipe	X	X					X
.229 Transmission oil level dipstick	X	X					X
.230 Air shutdown housing	X	X		X	X	X	X
.231 Transmission pump	X	X					

## .3 PRINCIPLES OF OPERATION

.31 How do the components work together to achieve the system's function?

.32 Using a diagram of the system, show the path of:

- a. Air from the air silencer to the cylinder head.
- b. Fuel from the fuel tank to the cylinder head.
- c. Seawater from the seawater suction valve to the engine exhaust
- d. Freshwater from the freshwater pump through the heat exchanger back to the freshwater pump.

## .4 PARAMETERS

For the items listed answer the following questions:

- A. What are the normal operating values and tolerances?
- B. Where are the parameters sensed or monitored?
- C. What is the physical location of the indicators?

.41 Lube oil temperature

.42 Lube oil pressure

.43 Drive oil pressure

.44 Engine RPM

.45 Amperage

.46 Freshwater temperature

.5 SYSTEM INTERFACE - None to be discussed.

## .6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system?

9213

EMERGENCY DIESEL GENERATOR SYSTEM

## References:

- a. Manufacturer's Technical Manual
- b. Engineman 3 & 2 (NAVEDTRA 91519)
- c. Ship's Information Book
- d. Naval Ships' Technical Manual, Chap 233 (NAVSEA 0905-233-001)
- e. Department of the Navy Oil Analysis Program (OPNAVINST 3700.2)

9213.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components.
- .12 Refer to a standard print of this system or to the equipment.

9213.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?
- H. What is the source of control signals?
- I. What are the interlocks?

	A	B	C	D	E	F	G
.21 Lube oil pump	X	X	X				X
.22 Lube oil filter	X	X					X
.23 Lube oil cooler		X	X				X
.24 Freshwater pump		X	X	X			X
.25 Freshwater cooler		X	X				X
.26 Seawater pump		X	X	X			X
.27 Fuel pump		X	X	X			X
.28 Fuel filter		X	X				X
.29 Engine block assembly		X	X				X
.210 Engine head assembly		X	X				X
.211 Governor assembly		X	X	X	X	X	X
.212 Blower		X	X	X			X
.213 Air starter		X	X	X			X
.214 Overspeed trip lever		X	X	X		X	X
.215 Day (fuel) tank		X	X				X
.216 Air cleaner		X	X				X
.217 Air shutdown housing		X	X	X	X	X	X
.218 Emergency shutdown valve (air/fuel)		X	X	X	X		X
.219 Fuel oil cooler		X	X				X
.220 ...		X	X				X

.226	Manual selector valve (3-position, 3-way)	X	X	X	X
.227	Manual start switch	X	X		X
.228	Pilot valve (1/4 inch)	X	X		X
.229	Main air pilot valve (1-1/4 inch)	X	X		X
.230	Air filter (1-1/4 inch)	X	X		X
.231	Pressure-regulating valve	X	X		X
.232	Clutch assembly	X	X		X
.233	Pyrometers	X	X		
.234	Generator lube oil pumps	X	X		X
.235	Air and switch box	X	X		
.236	Permanent magnet governor	X	X		
.237	Electric governor	X	X		
a.	Load sensor	X	X	X	X
b.	Frequency sensor	X	X	X	X
c.	Amplifier	X	X		X
d.	Power supply	X	X		X
.238	Air starter lubricator	X	X		X

### 3.3 PRINCIPLES OF OPERATION

.31 How do the components work together to achieve the system's function?

.32 Using a diagram of the system, show the path of:

- Lube oil from the sump through the engine and back to the sump.
- Fuel oil from the day tank through the engine and back to the tank.
- Seawater from the seawater pump through the expansion tank to board discharge.
- Freshwater from the expansion tank through the engine, back to expansion tank.
- Air from reducers to starter.
- Lube oil from sump through generator bearings back to sump.

.33 What indications will you receive if the system is malfunctioning?

### 3.4 PARAMETERS

For the items listed answer the following questions:

- What are the normal operating values and tolerances?
- Where are the parameters sensed or monitored?
- What is the physical location of the indicators?
- What is the alarm setpoint?

		A	B	C	D
.41	Lube oil pressure/temperature	X	X	X	X
.42	Seawater pressure/temperature	X	X	X	X
.43	Freshwater temperature/pressure	X	X	X	X
.44	Engine RPM	X	X	X	
.45	Exhaust temperature	X	X	X	
.46	Generator lube oil pressure	X	X	X	
.47	Generator lube oil temperature	X	X	X	

9213.4 PARAMETERS (CONT'D)

.48 Lube oil sump level  
.49 Generator sump level

A	B	C	D
X	X	X	
X	X	X	

9213.5 SYSTEM INTERFACE

.51 How do the following outside influences affect the system?  
a. Loss of ship's service turbogenerator (SSTG)  
b. Variations in electrical load demand

9213.6 SAFETY PRECAUTIONS

\* .61 What general safety precautions apply to this system?

X  
X

X

## References:

- a. Manufacturer's Technical Manual
- b. Machinist's Mate 3 & 2 (NAVEDTRA 10524)
- c. Engineman 3 & 2 (NAVEDTRA 91519)
- d. Ship's Information Book
- e. Naval Ships' Technical Manual, Chap 9590 (New 516) (NAVSEA 0901-LP-830-0002)

What is the function of this system?

1 Draw a diagram of this system showing all components listed below.  
 2 Refer to a standard print of this system or to the actual equipment.

2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?
- H. What is the source of control signals?

	A	B	C	D	E	F	G
21 Compressor	X	X	X	X	X		X
22 Relief valves		X	X			X	X
23 Condenser		X	X			X	X
24 Receiver		X	X			X	X
25 Filter dryer		X	X		X	X	X
26 Sight flow indicator		X	X				X
27 Evaporator (box coils)		X	X		X		X
28 Heat exchanger		X	X				X
29 Thermal-expansion valve (TXV)		X	X	X			X
30 Solenoid valves		X	X	X	X		X
31 Water-regulating valves (WRV)		X	X	X			X
32 Water failure pressure switch		X	X	X			X
33 Oil failure pressure switch		X	X	X			X
34 High-pressure (HP) discharge switch		X	X	X			X
35 Low-pressure (LP) operating switch		X	X	X			X
36 Evaporator pressure regulator (EPR)		X	X				
37 Thermostat switch		X	X	X		X	X
38 Water-reducing valve		X	X				X

9214.3 PRINCIPLES OF OPERATION (CONT'D)

.32 Using a diagram of the system, show the path of:

- R-12 refrigerant from the receiver through the system to the receiver.
- R-12 refrigerant from the compressor through the system to the compressor while hot gassing the boxes.

.33 What indications will you receive if the system is mal-

9214.4 PARAMETERS

For the items listed answer the following questions:

- What are the normal operating values and tolerance?
- Where are the parameters sensed or monitored?
- What is the physical location of the indicators?
- What is the temperature/pressure switch setpoint?

- .41 Compressor suction and discharge pressure
- .42 Receiver level
- .43 Moisture percentage
- .44 Liquid line temperature
- .45 Box temperatures
- .46 Oil pressure
- .47 Compressor suction and discharge temperature
- .48 Oil level
- .49 Condenser inlet and outlet temperature
- .410 Condenser cooling water pressure

9214.5 SYSTEM INTERFACE

.51 How do the following outside influences affect this system?

- Variations in firemain pressure
- Loss of electrical power
- Breakout/load stores operations

9214.6 SAFETY PRECAUTIONS

.61 What special safety precautions apply to charging the system with R-12?

9215

R-12 AIR-CONDITIONING PLANT (75-TON CAPACITY) SYSTEM

## References:

- a. Manufacturer's Technical Manual
- b. Engineman 3 & 2 (NAVEDTRA 91519)
- c. Ship's Information Book
- d. Naval Ships' Technical Manual, Chap 9590 (New 516) (NAVS LP-830-0002) and Chap 510 (NAVSEA S9086-RQ-STM-000)

## 9215.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components listed
- .12 Refer to a standard print of this system or to the actual equipment.

9215.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component fails?
- H. What are the positions and functions of each position?

	A	B	C	D	E	F	G	H
.21 Compressor	X	X	X	X	X			
.22 Condenser		X	X			X		
.23 Heat exchanger			X	X				
.24 Receiver			X	X				
.25 Filter dryer			X	X			X	X
.26 Chiller			X	X		X		
.27 Chilled water pump			X	X			X	
.28 Chilled water expansion tank			X	X		X	X	
.29 Motor controller			X	X	X	X	X	X
.210 Safety switches			X	X	X	X	X	X
.211 Pressure gauges			X	X			X	X
.212 Thermometers			X	X			X	X

9215.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system's
- .32 Using a diagram of the system, show the path of:

9215.4 PARAMETERS

For the items listed answer the following questions

- A. What are the normal operating values and tolerances?
- B. Where are the parameters sensed or monitored?
- C. What is the physical location of the indicators?

- .41 Compressor suction and discharge pressure
- .42 Compressor oil pressure
- .43 Cooling water pressure
- .44 Chilled water temperature (outlet)
- .45 Chilled water temperature (return)

9215.5 SYSTEM INTERFACE

- .51 How do the following outside influences affect the system?

  - a. Variations in firemain pressure
  - b. Loss of electrical power supply
  - c. Variations in ship's load demand
  - d. Alterations of Ventilation System

- .52 How does this system interface with the ship's electrical system?

9215.6 SAFETY PRECAUTIONS

- .61 What special safety precautions apply to charging the system with R-12?

9216

## MAIN DRAINAGE SYSTEM

### References:

- a. Ship's Information Book
- b. Naval Ships' Technical Manual, Chap 079, Vol 1  
(NAVSEA S9086-CN-STM-010)
- c. Damage Control Plate/Diagram 4

9216.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components listed
- .12 Refer to a standard print of this system or to the actual equipment.

9216.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What is the source of power?
- D. What are the modes of operation or control?
- E. What are the safety/protective devices?
- F. What protection is provided by it?
- G. What are the probable indications if this component

	A	B	C	D	E	F	G
.21 Bilge suction valve	X	X		X			
.22 Bulkhead cutout valve		X	X			X	
.23 Bilge strainer		X	X			X	X
.24 Eductors		X	X	X	X	X	X
.25 Firemain connectors		X	X				
.26 Main drainage piping		X	X			X	X
.27 Pressure gauges		X	X			X	X
.28 Skin valves (suction/discharge)		X	X				X

9216.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system's purpose?
- .32 Using a diagram of the system, show the path of bilge water from the bilge suction valve through the eductor to the overboard discharge point.
- .33 What indications will you receive if the system is malfunctioning?

9216.4 PARAMETERS

For the items listed answer the following questions:

9216.5 SYSTEM INTERFACE

.51 How do the following outside influences affect the system?

- a. Variations in 150 PSI steam pressure (bilge air)
- b. Operation of fire and bilge pumps using air

.52 How does this system interface with the Firemain?

9216.6 SAFETY PRECAUTIONS

.61 What general safety precautions apply to this system?

9217

SHORE STEAM SYSTEM

## Reference:

- a. Ship's Information Book

9217.1 What is the function of this system?

- .11 Draw a diagram of this system showing all components listed
- .12 Refer to a standard print of this system or to the actual equipment.

9217.2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What protection is provided by it?
- D. What are the probable indications if this component fails?

		A	B	C
.21	Deck risers	X	X	
.22	Relief valve (150 PSI)	X	X	X
.23	Stop valves	X	X	
.24	Steam reducer (50 PSI)	X	X	
.25	In-line valves	X	X	
.26	Condensate overboard valve	X	X	
.27	Strainer	X	X	X
.28	Ship-to-shore hose	X	X	
.29	Pressure gauges	X	X	
.210	Thermometers	X	X	

9217.3 PRINCIPLES OF OPERATION

- .31 How do the components work together to achieve the system's
- .32 Using a diagram of the system, show the path of steam from the risers to the condensate overboard valve.
- .33 What indications will you receive if the system is malfunctioning?

9217.4 PARAMETERS

For the items listed answer the following questions:

- A. What are the normal operating values and tolerances?
- B. Where are the parameters sensed or monitored?
- C. What is the physical location of the indicators?

.41 Shore steam pressure

9217.5 SYSTEM INTERFACE

.51 How does this system interface with

- a. Laundry
- b. Ship's galley
- c. Ship's hot water heaters

9217.6 SAFETY PRECAUTIONS

.61 What general safety precautions app

## References:

- a. Manufacturer's Technical Manual
- b. Machinist's Mate 3 & 2 (NAVEDTRA 10524)
- c. Engineman 3 & 2 (NAVEDTRA 91519)
- d. Ship's Information Book
- e. Naval Ships' Technical Manual, Chap 9590 (New 516) (NAVSEA 0901 830-0002), Chap 510 (Old 9380) (NAVSEA S9086-RQ-STM-000), Chap (New 503) (NAVSEA 0901-LP-470-0012) and Chap 9480 (New 505) (NAVSEA 0901-LP-480-0002)

1 What is the function of this system?

11 Draw a diagram of this system showing all components listed below.  
12 Refer to a standard print of this system or to the actual equipment.

2 SYSTEM COMPONENTS AND COMPONENT PARTS

Discuss the designated items for the following components and component parts:

- A. What is its function?
- B. Where is it located?
- C. What are the safety/protective devices?

	A	B	C
21 Pump	X	X	X
22 Suction valve	X	X	
23 Discharge valve	X	X	
24 Balancing valves	X	X	
25 Main cross-connect valves	X	X	
26 Main cutout valves	X	X	
27 Expansion tank	X	X	X
28 Chiller	X	X	X
29 Temperature control (thermostats, solenoid valves)	X	X	X
210 Expansion tank air charging system	X	X	X

3 PRINCIPLES OF OPERATION

31 How do the components work together to achieve the system's function?

32 Using a diagram of the system, show the path of chilled water from the expansion tank to the chilled water return line, through the chilled water pump to the system.

4 PARAMETERS

For the following listed items, answer the following questions:

9218.4 PARAMETERS (CONT'D)

- .42 Chilled water flow rate
- .43 Expansion tank level
- .44 Expansion tank air pressure

9218.5 SYSTEM INTERFACE

- .51 How do the following outside influences affect the system?
  - a. Variations in space temperature
  - b. Variations in low-pressure (LP) air pressure
- .52 How does this system interface with the following?
  - a. Magazines
  - b. Berthing areas
  - c. Electronic workshops

9218.6 SAFETY PRECAUTIONS

- .61 What general safety precautions apply to this system?

FINAL QUALIFICATION AS  
FF-1052 CLASS DUTY AUXILIARYMAN

NAME \_\_\_\_\_ RATE/RANK \_\_\_\_\_

This page is to be used as a record of satisfactory completion of sections of the Personnel Qualification Standard (PQS). Only specified may signify completion of applicable sections either by written or oral or by observation of performance. The examination or checkout need not item; however, a sufficient number should be covered to demonstrate the knowledge. Should supervisors "give away" their signatures, unnecessary can be expected in future routine operations.

This qualification section is to be maintained by the trainee and u ensure awareness of remaining tasks.

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QUALIFICATION

Having observed satisfactory performance, it is recommended the tra be designated a qualified FF-1052 CLASS DUTY AUXILIARYMAN (9308).

RECOMMENDED \_\_\_\_\_ DATE \_\_\_\_\_  
(Supervisor)RECOMMENDED \_\_\_\_\_ DATE \_\_\_\_\_  
(Division Officer)RECOMMENDED \_\_\_\_\_ DATE \_\_\_\_\_  
(Department Head)QUALIFIED \_\_\_\_\_ DATE \_\_\_\_\_  
(Commanding Officer)SERVICE RECORD ENTRY \_\_\_\_\_ DATE \_\_\_\_\_  
(Personnel Officer)

FF-1052 CLASS DUTY AUXILIARYMAN

QUALIFICATION SUMMARY

PQS INDOCTRINATION

COMPLETED

(Training Officer/Date)

COMPRESSED AIR SYSTEMS OPERATOR (9301)

Recommended

(Supervisor/Date)

Recommended

(Division Officer/Date)

QUALIFIED

(Department)

SMALL BOAT ENGINE OPERATOR (9302)

Recommended

(Supervisor/Date)

Recommended

(Division Officer/Date)

QUALIFIED

(Department)

EMERGENCY DIESEL GENERATOR OPERATOR (9303)

Recommended

(Supervisor/Date)

Recommended

(Division Officer/Date)

QUALIFIED

(Department)

R-12 REFRIGERATION PLANT OPERATOR (9304)

Recommended

(Supervisor/Date)

Recommended

(Division Officer/Date)

QUALIFIED

(Department)

R-12 AIR-CONDITIONING/CHILLED WATER PLANT OPERATOR (9305)

Recommended

(Supervisor/Date)

Recommended

(Division Officer/Date)

QUALIFIED

(Department)

ELECTROHYDRAULIC STEERING GEAR OPERATOR (9306)

QUALIFICATION SUMMARY (CONT'D)

JP-5 PUMPROOM OPERATOR (9307)

Recommended

(Supervisor/Date)

Recommended

(Division Officer/Date)

QUALIFIED

(Department Head)



FINAL QUALIFICATION AS  
FF-1052 CLASS AUXILIARY DIVISION SUPERVISOR

RATE/RANK

This page is to be used as a record of satisfactory completion of designated sections of the Personnel Qualification Standard (PQS). Only specified signatures signify completion of applicable sections either by written or oral examination or by observation of performance. The examination or checkout need not cover all sections; however, a sufficient number should be covered to demonstrate the examinee's knowledge. Should supervisors "give away" their signatures, unnecessary disclosure may be expected in future routine operations.

This qualification section is to be maintained by the trainee and updated to insure awareness of remaining tasks.

QUALIFICATION

Having observed satisfactory performance, it is recommended the trainee be designated a qualified FF-1052 CLASS AUXILIARY DIVISION SUPERVISOR (9309)

COMMENDED

(Supervisor)

DATE

COMMENDED

(Division Officer)

DATE

COMMENDED

(Department Head)

DATE

QUALIFIED

(Commanding Officer)

DATE

VICE RECORD ENTRY

(Personnel Officer)

DATE

FF-1052 CLASS AUXILIARY DIVISION SUPER

QUALIFICATION SUMMARY

PQS INDOCTRINATION

COMPLETED

(Training Officer/Date)

FF-1052 CLASS DUTY AUXILIARYMAN (NAVEDTRA 43112-9BQ1)

COMPLETED

(Department Head/Date)

9301

WATCHSTATION - COMPRESSED AIR SYSTEMS OPERATOR

Estimated completion time: 23 weeks

Before starting your assigned tasks, complete the following:

Fundamentals: 9101, 9105 and 9106 (17% of watchstation)

Systems: 9208 and 9209 (62% of watchstation)

9301.1 TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What safety precautions must be observed?
- D. What communications must be established?
- E. What parameters must be monitored?
- F. Perform this task.

.11 Line up, start, operate, and secure LP air compressor

(Signature)

(Date)

.12 Line up, start, operate, and secure HP air compressor

(Signature)

(Date)

.13 Record all temperatures and pressures on operating air compressor

(Signature)

(Date)

.14 Line up compressor to supply ship's service and vital air systems

(Signature)

(Date)

.15 Adjust water-regulating valve

(Signature)

(Date)

9301.1 TASKS (CONT'D)

.17 Adjust lubricator

(Signature)

(Date)

.18 Drain condensate from receivers and separators

(Signature)

(Date)

.19 Line up, start, operate, and secure dehydrators

(Signature)

(Date)

Completion of .1 area comprises 9% of watchstation

9301.2 INFREQUENT TASKS

For the infrequent tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What safety precautions must be observed?
- D. What communications must be established?
- E. What parameters must be monitored?
- F. How are monitored parameters changed by this infrequent task?
- G. What conditions require this infrequent task?
- H. Perform or simulate this task.

.21 Line up HP to LP emergency cross-connect valves

(Signature)

(Date)

.22 Operate compressor in manual

(Signature)

(Date)

Completion of .2 area comprises 2% of watchstation

9301.3 ABNORMAL CONDITIONS

9301.3 ABNORMAL CONDITIONS (CONT'D)

- E. What emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this condition affect other operations/equipment/watchstations?
- G. What followup action is required?
- H. Perform or simulate the corrective/immediate action for this abnormal condition.

.31 Lubricator improperly adjusted

(Signature) (Date)

.32 Insufficient cooling water

(Signature) (Date)

.33 Low lube oil pressure

(Signature) (Date)

.34 Loss of dehydrator

(Signature) (Date)

Completion of .3 area comprises 4% of watchstation.

9301.4 EMERGENCIES

For the emergency conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What other emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this emergency affect other operations/equipment/watchstations?
- G. Perform or simulate the immediate action for this emergency condition.

.41 Overheated air cylinder

(Signature) (Date)

9301.4 EMERGENCIES (CONT'D)

.43 Loss of LP air compressor

(Signature)

(Date)

.44 Loss HP air compressor

(Signature)

(Date)

.45 Pounding in compressor

(Signature)

(Date)

.46 Rupture in piping

(Signature)

(Date)

.47 Oil in accumulator

(Signature)

(Date)

.48 Loss of cooling water

(Signature)

(Date)

.49 Loss of lube oil pressure

(Signature)

(Date)

Completion of .4 area comprises 4% of watchstation

9301.5 WATCHES

Stand three satisfactory watches under qualified sup

SIGNATURE

9302

## WATCHSTATION - SMALL BOAT ENGINE OPERATOR

Estimated completion time: 19 weeks

Before starting your assigned tasks, complete the following

Watchstation: 9301

Fundamentals: 9102 and 9103 (36% of watchstation)

Systems: 9211 and 9212 (45% of watchstation)

9302.1

### TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What safety precautions must be observed?
- D. What parameters must be monitored?
- E. Perform this task IAW EOSS/EDORM.

.11 Check oil and water levels

(Signature)

(Date)

.12 Line up, start, operate, and secure engine

(Signature)

(Date)

.13 Change throttle position

(Signature)

(Date)

.14 Shift from ahead to reverse

(Signature)

(Date)

Completion of .1 area comprises 4% of watchstation.

9302.2

### INFREQUENT TASKS

For the infrequent tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What safety precautions must be observed?

9302.2 INFREQUENT TASKS (CONT'D)

.21 Start engine using ether

(Signature)

(Date)

Completion of .2 area comprises 1% of watchstation.

9302.3 ABNORMAL CONDITIONS

For the abnormal conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What emergencies or malfunctions may occur if immediate action is not taken?
- F. What followup action is required?
- G. What safety precautions must be observed?
- H. Perform or simulate the corrective/immediate action for the abnormal condition.

.31 Fuel oil leaks

(Signature)

(Date)

.32 Lubricating oil leaks

(Signature)

(Date)

.33 Cooling system leaks

(Signature)

(Date)

.34 Fouled heat exchanger

(Signature)

(Date)

.35 Vibration in engine, transmission, or propeller shaft

(Signature)

(Date)

.36 Water or foreign matter in fuel

9302.3 ABNORMAL CONDITIONS (CONT'D)

.37 Improper engine timing

(Signature)

(Date)

.38 Unusual noise in engine

(Signature)

(Date)

Completion of .3 area comprises 6% of watchstation.

9302.4 EMERGENCIES

For the emergency conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What other emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this emergency affect other operations/equipment/watchstations?
- G. Perform or simulate the immediate action for this emergency condition.

.41 Loss of lubricating oil

(Signature)

(Date)

.42 High cooling water temperature

(Signature)

(Date)

.43 Loss of cooling water

(Signature)

(Date)

.44 Fouled propeller

(Signature)

(Date)

.45 Fouled/frozen fuel injector

9302.4 EMERGENCIES (CONT'D)

.46 Engine failure

(Signature)

(Date)

.47 Bent or broken propeller/shaft

(Signature)

(Date)

Completion of .4 area comprises 5% of watchst

9302.5 WATCHES

Stand three satisfactory watches under qualified

SIGNATURE

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Completion of .5 area comprises 3% of watchst

9303

WATCHSTATION - EMERGENCY DIESEL GENERATOR OPERATOR

Estimated completion time: 24 weeks

Before starting your assigned tasks, complete the following:

Watchstation: 9302

System: 9213 (27% of watchstation)

9303.1

TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What safety precautions must be observed?
- D. What communications must be established?
- E. What control/coordination is required?
- F. What parameters must be monitored?
- G. What are valve position indications?
- H. What are the functions of the indicator lights and alarms?
- I. Perform this task.

.11 Line up, start, and operate emergency diesel generator

A B

X X

(Signature)

(Date)

.12 Record all temperatures and pressures on operating diesels

X X

(Signature)

(Date)

.13 Secure emergency diesel generator

X X

(Signature)

(Date)

.14 Prepare emergency diesel generator for automatic starting

X X

(Signature)

(Date)

.15 Automatically start emergency diesel generator

X X

9303.2 INFREQUENT TASKS

For the infrequent tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What control/coordination is required?
- D. What communications must be established?
- E. What safety precautions must be observed?
- F. What parameters must be monitored?
- G. How are monitored parameters changed by this infrequent task?
- H. What conditions require this infrequent task?
- I. What are the breaker position indications?
- J. What are the disconnect position indications?
- K. What are the bus tie position indications?
- L. Perform or simulate this task IAW EOSS/EOCC/EDO

.21 Shift from ship's service power to emergency power

(Signature)

(Date)

.22 Shift from shore power to emergency power

(Signature)

(Date)

Completion of .2 area comprises 7% of watchstation

9303.3 ABNORMAL CONDITIONS

For the abnormal conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this condition affect other operations and watchstations?
- G. What followup action is required?
- H. What safety precautions must be observed?
- I. Perform or simulate the corrective/immediate action for this abnormal condition.

.31 Lube oil leaks (internal/external)

(Signature)

(Date)

.33 Cooling water leaks (internal/external)

(Signature)

(Date)

.34 Fouled heat exchanger

(Signature)

(Date)

.35 Improper engine timing

(Signature)

(Date)

.36 Vibration/knocking in engine

(Signature)

(Date)

.37 Water/foreign matter in fuel

(Signature)

(Date)

.38 Contaminated lube oil

(Signature)

(Date)

.39 Emergency diesel governor hunting/surging

(Signature)

(Date)

Completion of .3 area comprises 13% of watchstation.

9303.4 EMERGENCIES

For the emergency conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What other emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this emergency affect other operations/equipment/watchstations?
- G. Perform or simulate the immediate action for this emergency condition.

9303.4 EMERGENCIES (CONT'D)

.41 Loss of lube oil

(Signature) (Date)

.42 High lube oil temperature

(Signature) (Date)

.43 High cooling water temperature

(Signature) (Date)

.44 Loss of cooling water (freshwater or seawater)

(Signature) (Date)

.45 Engine fails to start automatically

(Signature) (Date)

.46 Engine failure

(Signature) (Date)

.47 Loss of governor control

(Signature) (Date)

.48 Loss of starting air

(Signature) (Date)

Completion of .4 area comprises 10% of watchstation

9303.5 WATCHES

Stand six satisfactory watches under qualified supervision

9303.5

WATCHES (CONT'D)

SIGNATURE

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Completion of .5 area comprises 4% of watchstation



9304

WATCHSTATION - R-12 REFRIGERATION PLANT OPERATOR

Estimated completion time: 23 weeks

Before starting your assigned tasks, complete the following it

Watchstation: 9303

Fundamental: 9104 (33% of watchstation)

System: 9214 (18% of watchstation)

9304.1

TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What communications must be established?
- D. What safety precautions must be observed?
- E. What parameters must be monitored?
- F. Perform this task.

.11 Line up, start, operate, and secure  
refrigeration plant

A B C D

X X X X

(Signature) (Date)

.12 Record all temperatures and pressures

X X X

(Signature) (Date)

.13 Purge air from condenser

X X X

(Signature) (Date)

.14 Make adjustments to water-regulating valve

X X X

(Signature) (Date)

.15 Pump down refrigerant to receiver

X X X

(Signature) (Date)

.16 Start standby compressor unit

X X X X

9304.1 TASKS (CONT'D)

.17 Inspect condition of refrigeration coils

(Signature)

(Date)

.18 Break out/load stores

(Signature)

(Date)

Completion of .1 area comprises 18% of watchstation

9304.2 INFREQUENT TASKS

For the infrequent tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What communications must be established?
- D. What safety precautions must be observed?
- E. What parameters must be monitored?
- F. How are monitored parameters changed by this infrequent task?
- G. What conditions require this infrequent task?
- H. Perform or simulate this task IAW EOSS/EOCC/EDORM.

.21 Operate chill box as freeze box

(Signature)

(Date)

.22 Operate two compressors on split plant

(Signature)

(Date)

.23 Operate water-regulating valve in bypass mode

(Signature)

(Date)

Completion of .2 area comprises 6% of watchstation

9304.3 ABNORMAL CONDITIONS

For the abnormal conditions listed below:

9304.3 ABNORMAL CONDITIONS (CONT'D)

G. What followup action is required?

H. Perform or simulate the corrective/immediate action for abnormal condition.

.31 Malfunction of water-regulating valve

(Signature)

(Date)

.32 Overcharge of refrigerant

(Signature)

(Date)

.33 Undercharge of refrigerant

(Signature)

(Date)

.34 Malfunction of thermal-expansion valve

(Signature)

(Date)

.35 Restriction in condenser tube bundle

(Signature)

(Date)

.36 Restriction in liquid line

(Signature)

(Date)

.37 Malfunction of capacity control valve

(Signature)

(Date)

.38 Malfunction of safety switches

(Signature)

(Date)

.39 Loss of compressor oil pressure

(Signature)

(Date)

9304.4 EMERGENCIES

For the emergency conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What other emergencies or malfunctions may occur if action is not taken?
- F. How does this emergency affect other operations/equipment/watchstations?
- G. Perform or simulate the immediate action for this emergency condition.

.41 Loss of cooling water

(Signature)

(Date)

.42 Loss of electrical power

(Signature)

(Date)

.43 Loss of refrigerant

(Signature)

(Date)

.44 Loss of compressor oil

(Signature)

(Date)

.45 Liquid floodback

(Signature)

(Date)

Completion of .4 area comprises 9% of watchstation.

9304.5 WATCHES

Stand five satisfactory watches under qualified supervision

SIGNATURE

304.5

WATCHES (CONT'D)

SIGNATURE

D

Completion of .5 area comprises 3% of watchstation.



9305

WATCHSTATION - R-12 AIR-CONDITIONING/CHILLED WATER PLAN

Estimated completion time: 29 weeks

Before starting your assigned tasks, complete the following:

Watchstation: 9304

Systems: 9215 and 9218 (27% of watchstation)

9305.1

TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What communications must be established?
- D. What safety precautions must be observed?
- E. What parameters must be monitored?
- F. What are valve position indications?
- G. Perform this task IAW EOSS/EDORM.

.11 Line up cooling water to air-conditioning condenser

(Signature)

(Date)

.12 Line up, start, operate, and secure chilled water circulating pump

(Signature)

(Date)

.13 Line up, start, operate, and secure air-conditioning plant compressor

(Signature)

(Date)

.14 Record all pressures and temperatures

(Signature)

(Date)

.15 Line up, start, and operate air-conditioning seawater circulating pump

(Signature)

(Date)

INFREQUENT TASKS

For the infrequent tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What conditions require this infrequent task?
- D. What communications must be established?
- E. What safety precautions must be observed?
- F. What parameters must be monitored?
- G. How are monitored parameters changed by this infrequent task?
- H. Perform or simulate this task IAW EOSS/EOCC/EDORM.

	A	B	C	D
.21 Operate water-regulating valve in bypass	X	X	X	

(Signature) (Date)

.22 Use pilot-operated expansion valve in manual mode	X	X	X
---	---	---	---

(Signature) (Date)

.23 Operate split plant	X	X	X	X
-------------------------	---	---	---	---

(Signature) (Date)

.24 Vent air from cooling coils	X	X	X	X
---------------------------------	---	---	---	---

(Signature) (Date)

Completion of .2 area comprises 5% of watchstation.

ABNORMAL CONDITIONS

For the abnormal conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What emergencies or malfunctions may occur if immediate action not taken?
- F. How does this condition affect other operations/equipment/watchstations?
- G. What followup action is required?
- H. Perform or simulate the corrective/immediate action for this condition.

9305.3 ABNORMAL CONDITIONS (CONT'D)

.32 Restriction in condenser tube bundle

(Signature) (Date)

.33 Improper adjustment of water-regulating valve

(Signature) (Date)

.34 Moisture mixed with refrigerant

(Signature) (Date)

.35 Overcharge of refrigerant

(Signature) (Date)

.36 Undercharge of refrigerant

(Signature) (Date)

.37 Improperly operating safety switch

(Signature) (Date)

.38 Erratic operation of thermal-expansion valve

(Signature) (Date)

.39 Air in chilled water system

(Signature) (Date)

.310 Restriction in liquid line

(Signature) (Date)

Completion of .3 area comprises 11% of watchstation

9305.4 EMERGENCIES

9305.4 EMERGENCIES (CONT'D)

- D. What operating limitations are imposed?
- E. What other emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this emergency affect other operations/other watchstations?
- G. Perform or simulate the immediate action for this condition.

.41 Loss of seawater cooling

(Signature)

(Date)

.42 Loss of electrical power

(Signature)

(Date)

.43 Loss of chilled water

(Signature)

(Date)

Completion of .4 area comprises 7% of watchstation

9305.5 WATCHES

Stand five satisfactory watches under qualified super

SIGNATURE

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Completion of .5 area comprises 3% of watchstation

9306

## WATCHSTATION - ELECTROHYDRAULIC STEERING GEAR OPERATOR

Estimated completion time: 12 weeks

Before starting your assigned tasks, complete the following:

Watchstation: 9305

System: 9210 (28% of watchstation)

### 9306.1 TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What communications must be established?
- D. What safety precautions must be observed?
- E. What parameters must be monitored?
- F. What are the valve position indications?
- G. What are the breaker position indications?
- H. Perform this task IAW EOSS/EDORM.

.11 Line up, start, operate, and secure steering unit

(Signature)

(Date)

.12 Shift units

(Signature)

(Date)

(Signature)

(Date)

Completion of .1 area comprises 47% of watchstat

### 9306.2 INFREQUENT TASKS

For the infrequent tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What control/coordination is required?
- D. What safety precautions must be observed?
- E. What communications must be established?
- F. What parameters must be monitored?
- G. How are monitored parameters changed by this infrequent task?
- H. What conditions require this infrequent task?
- I. Perform an simulate this task IAW EOSS/EOCC/EDORM

9306.2 INFREQUENT TASKS (CONT'D)

.22 Shift to emergency steering

(Signature)

(Date)

Completion of .2 area comprises 8% of watchstation.

9306.3 ABNORMAL CONDITIONS

For the abnormal conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this condition affect other operations/equipment/watchstations?
- G. What followup action is required?
- H. Perform or simulate the corrective/immediate action for this abnormal condition.

.31 Air in hydraulic lines

(Signature)

(Date)

.32 Broken universal joint

(Signature)

(Date)

.33 Low service tank level

(Signature)

(Date)

.34 Low pressure on accumulator

(Signature)

(Date)

Completion of .3 area comprises 8% of watchstation.

9306.4 EMERGENCIES

For the emergency conditions listed below:

A. What indications and alarms are received?

9306.4

EMERGENCIES (CONT'D)

- E. What other emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this emergency affect other operations/equipment/watchstations?
- G. Perform or simulate the immediate action for this emergency condition.

.41 Loss of electrical power

(Signature)

(Date)

.42 Loss of hydraulic oil pressure

(Signature)

(Date)

Completion of .4 area comprises 4% of watchstation.

9306.5

WATCHES

Stand five satisfactory watches under qualified supervision.

SIGNATURE

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Completion of .5 area comprises 5% of watchstation.

WATCHSTATION - JP-5 PUMPROOM OPERATOR

Estimated completion time: 12 weeks

Before starting your assigned tasks, complete the following items:

Watchstation: 9306

System: 9205 (18% of watchstation)

307.1

TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What control/coordination is required?
- D. What communications must be established?
- E. What safety precautions must be observed?
- F. What parameters must be monitored?
- G. Perform this task.

.11 Line up, start, operate, and secure JP-5 service and transfer pumps

A B C D E

X X X X X

(Signature) (Date)

.12 Line up, operate, and secure stripping pump

X X X X X

(Signature) (Date)

.13 Line up, operate, and secure fueling for helicopter in flight/on deck

X X X X X

(Signature) (Date)

.14 Monitor all pressures

X X X

(Signature) (Date)

.15 Sound and record all levels on tanks

X X X X X

(Signature) (Date)

.16 Pump JP-5 fuel

X X X X X

X

9307.1 TASKS (CONT'D)

.17 Take on JP-5

(Signature) (Date)

.18 Recirculate JP-5 through service tank system

(Signature) (Date)

.19 Line up, operate, and secure fueling for  
small boat

(Signature) (Date)

.110 Maintain quality control record

(Signature) (Date)

Completion of .1 area comprises 54% of watchstation

9307.2 INFREQUENT TASKS

For the infrequent tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What control/coordination is required?
- D. What communications must be established?
- E. What safety precautions must be observed?
- F. What parameters must be monitored?
- G. How are monitored parameters changed by this infreq
- H. What conditions require this infrequent task?
- I. Perform or simulate this task IAW EOSS/EOCC/EDORM.

.21 Line up, operate, and secure transfer system  
for day tank and aviation tank

(Signature) (Date)

.22 Air test JP-5 fuel tanks

(Signature) (Date)

.23 Defuel JP-5 storage tanks

A  
X

X

X

X

Completion of .2 area comprises 8% of watchstation.

9307.3

### ABNORMAL CONDITIONS

For the abnormal conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this condition affect other operations/equipment/watchstations?
- G. What followup action is required?
- H. Perform or simulate the corrective/immediate action for this abnormal condition.

.31 High differential pressure across filter separator

(Signature) (Date)

.32 Water in fuel

(Signature) (Date)

.33 Fuel service and transfer pump malfunction

(Signature) (Date)

Completion of .3 area comprises 6% of watchstation.

9307.4

### EMERGENCIES

For the emergency conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What other emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this emergency affect other operations/equipment/watchstations?
- G. Perform or simulate the immediate action for this emergency condition.

.41 Fuel tank overflow

9307.4 EMERGENCIES (CONT'D)

.42 Contaminated fuel

(Signature)

(Date)

.43 Fuel service and transfer pump casualty

(Signature)

(Date)

.44 Contaminated tank overflow

(Signature)

(Date)

Completion of .4 area comprises 8% of watchstation

9307.5 WATCHES

Stand five satisfactory watches under qualified super

SIGNATURE

Completion of .5 area comprises 6% of watchstation

9308

WATCHSTATION - FF-1052 CLASS DUTY AUXILIARYMAN

Estimated completion time: 15 weeks

Before starting your assigned tasks, complete the following

Watchstation: 9307

Systems: 9201 thru 9204, 9206, 9207, 9216, 9217  
(42% of watchstation)

9308.1 TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What safety precautions must be observed?
- D. What communications must be established?
- E. What control/coordination is required?
- F. What parameters must be monitored?
- G. How are monitored parameters changed by this task?
- H. What are valve position indications?
- I. Perform this task.

.11 Start, operate, and secure fire pump

A B  
X X

(Signature) (Date)

.12 Line up firemain system for operation

X X

(Signature) (Date)

.13 Line up main drainage system

X X

(Signature) (Date)

.14 Line up, operate, and secure drainage eductors

X X

(Signature) (Date)

.15 Line up, test, operate, and secure ship's whistle

X X

9308.1 TASKS (CONT'D)

.17 Start, operate, and secure emergency diesel

(Signature)

(Date)

.18 Start, operate, and secure small boat engines

(Signature)

(Date)

.19 Line up shore steam for ship's service

(Signature)

(Date)

.110 Line up, operate, and secure air-conditioning system

(Signature)

(Date)

.111 Line up, operate, and secure refrigeration system

(Signature)

(Date)

.112 Line up, operate, and secure package conveyor

(Signature)

(Date)

.113 Line up, operate, and secure HP/LP air compressors

(Signature)

(Date)

Completion of .1 area comprises 12% of watchstation

9308.2 INFREQUENT TASKS

For the infrequent tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What safety precautions must be observed?
- D. What communications must be established?

.2 INFREQUENT TASKS (CONT'D)

- G. How are monitored parameters changed by this infrequent task?
- H. What conditions require this infrequent task?
- I. Perform or simulate this task IAW EOSS/EOCC/EDORM.

.21 Operate with single engine

A	B	C	D	E	F	G
X	X	X	X	X	X	X

(Signature) (Date)

.22 Start diesel engine using ether

X X X X X X

(Signature) (Date)

.23 Assume manual control of diesel engine

X X X X X X

(Signature) (Date)

.24 Drag start one diesel engine

X X X X X X

(Signature) (Date)

.25 Operate diesel generator at 50-percent load

X X X X X X X

(Signature) (Date)

Completion of .2 area comprises 7% of watchstation.

.3 ABNORMAL CONDITIONS

For the abnormal conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What emergencies or malfunctions may occur if immediate action not taken?
- F. How does this condition affect other operations/equipment/watchstations?
- G. What followup action is required?
- H. What safety precautions must be observed?
- I. Perform or simulate the corrective/immediate action for this abnormal condition.

9308.3 ABNORMAL CONDITIONS (CONT'D)

.32 Low cooling water on HP air compressors

(Signature) (Date)

.33 Low oil level/pressure in HP/LP air compressors

(Signature) (Date)

.34 Improper diesel engine timing

(Signature) (Date)

.35 Low firemain pressure

(Signature) (Date)

.36 Low fuel in emergency generator day tank

(Signature) (Date)

.37 Low hydraulic oil in steering gear service tanks

(Signature) (Date)

.38 Low charge in chilled water expansion tank

(Signature) (Date)

.39 Low oil level in refrigeration or air-conditioning compressors

(Signature) (Date)

.310 Overcharge or undercharge of refrigerant in refrigeration or air-conditioning systems

(Signature) (Date)

.311 Emergency diesel governor hunting/surging

A  
X

X

X

X

X

X

X

X

X

X

308.3 ABNORMAL CONDITIONS (CONT'D)A B C D  
X X X X

.312 Contaminated fuel in day tank

(Signature) (Date)

.313 Low lube oil pressure on diesel

X X X X

(Signature) (Date)

.314 High water temperature on diesel

X X X X

(Signature) (Date)

.315 External leak on diesel

X X X X

(Signature) (Date)

.316 Low starting air pressure for diesel

X X X X

(Signature) (Date)

.317 Leaking hydraulic lines/fittings on steering gear

X X X X

(Signature) (Date)

.318 Loss of cooling water pump for diesel

X X X X

(Signature) (Date)

.319 Unusual noise or vibration in diesel engine

X X X X

(Signature) (Date)

Completion of .3 area comprises 19% of watchstation.

9308.4 EMERGENCIES

For the emergency conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?

- D. What operating limitations are imposed?
- E. What other emergencies or malfunctions may action is not taken?
- F. How does this emergency affect other operator watchstations?
- G. Perform or simulate the immediate action for this condition.

.41 Ruptured external/internal fuel and oil lines or

(Signature)

(Date)

.42 Loss of governor control on diesel

(Signature)

(Date)

.43 Loss of freshwater from cooling system on diesel

(Signature)

(Date)

.44 Loss of refrigerant from refrigeration or air-conditioning plants

(Signature)

(Date)

.45 Loss of cooling water from condenser on refrigeration or air-conditioning plants

(Signature)

(Date)

.46 Ruptured hydraulic lines on steering gear

(Signature)

(Date)

.47 Ruptured evaporator tubes in refrigeration or air-conditioning plants

(Signature)

(Date)

.48 Loss of oil in refrigeration or air-conditioning

(Signature)

(Date)

9308.4 EMERGENCIES (CONT'D)

.49 Diesel engine failure

(Signature) (Date)

.410 Fouled propeller (small boats)

(Signature) (Date)

.411 Ruptured or leaking tubes in condenser

(Signature) (Date)

.412 Loss of shore steam

(Signature) (Date)

.413 Loss of ship's electrical distribution system

(Signature) (Date)

.414 Failure of steam reducers

(Signature) (Date)

.415 Clogged drain lines from steam-operated equipment

(Signature) (Date)

.416 Failure of HP/LP air compressors

(Signature) (Date)

Completion of .4 area comprises 15% of watchstation.

9308.5

WATCHES

Stand five satisfactory watches under qualified supervision.

SIGNATURE

9308.5 WATCHES (CONT'D)

SIGNATURE

Completion of .5 area comprises 5% of watchs

9309

WATCHSTATION - FF-1052 CLASS AUXILIARYMAN DIVISION SUPER

Estimated completion time: 4 weeks

Before starting your assigned tasks, complete the following

PQS Qualification: NAVEDTRA 43112-9BQ1

9309.1

TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What control/coordination is required?
- D. What communications must be established?
- E. What safety precautions must be observed?
- F. What parameters must be monitored?
- G. Perform this task IAW EOSS/EDORM.

.11 Pre-underway check and startup of auxiliary division equipment for getting underway

(Signature)

(Date)

.12 Secure equipment upon entering port

(Signature)

(Date)

.13 Assign auxiliary division personnel to the watch, quarter, and station bill

(Signature)

(Date)

.14 Estimate time, labor, and materials required for repairs

(Signature)

(Date)

.15 Prepare shipyard request

(Signature)

(Date)

Completion of .1 area comprises 18% of watchstation.

## 9309.2 INFREQUENT TASKS

For the tasks listed below:

- A. What are the steps of this procedure?
- B. What are the reasons for each step?
- C. What control/coordination is required?
- D. What communications must be established?
- E. What safety precautions must be observed?
- F. What parameters must be monitored?
- G. How are monitored parameters changed by this infrequent task?
- H. What conditions require this infrequent task?
- I. Perform or simulate this task IAW EOSS/EOCC/EDORM.

.21 Operate air-conditioning and refrigeration plants in manual mode

A  
X

(Signature) (Date)

.22 Operate hydraulic steering in manual mode

X

(Signature) (Date)

.23 Operate HP/LP air compressors in manual mode

X

(Signature) (Date)

.24 Operate emergency diesel in manual mode

X

(Signature) (Date)

Completion of .2 area comprises 14% of watchstation.

## 9309.3 ABNORMAL CONDITIONS

For the abnormal conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What emergencies or malfunctions may occur if immediate action is not taken?
- F. How does this condition affect other operations/watchstations?
- G. What followup action is required?

.32 Failure of emergency diesel to start automatically

(Signature)

(Date)

.33 High temperatures on refrigeration boxes

(Signature)

(Date)

.34 Low firemain pressure to auxiliary equipment

(Signature)

(Date)

.35 Excessive pressure in HP/LP drain system

(Signature)

(Date)

.36 Unusual noise or vibration in emergency diesel

(Signature)

(Date)

.37 Low oil level/pressure in steering gear

(Signature)

(Date)

Completion of .3 area comprises 25% of watchstation.

#### 9309.4 EMERGENCIES

For the emergency conditions listed below:

- A. What indications and alarms are received?
- B. What immediate action is required?
- C. What are the probable causes?
- D. What operating limitations are imposed?
- E. What other emergencies or malfunctions may occur if inaction is not taken?
- F. How does this emergency affect other operations/equipment/watchstations?
- G. Perform or simulate the immediate action for this emergency condition.

.41 Failure of emergency diesel

(Signature)

(Date)

9309.4 EMERGENCIES (CONT'D)

.42 Failure of HP/LP air compressors

(Signature)

(Date)

.43 Loss of hydraulic oil pressure in steering system

(Signature)

(Date)

.44 Loss of ship's service steam

(Signature)

(Date)

.45 Loss of firemain pressure

(Signature)

(Date)

.46 Failure of small boat engine

(Signature)

(Date)

.47 Liquid floodback in air-conditioning and refrigeration

(Signature)

(Date)

Completion of .4 area comprises 25% of watchstat

9309.5 WATCHES

Stand five satisfactory watches under qualified super

SIGNATURE

Completion of .5 area comprises 18% of watchstat

Personnel Qualification Standard  
Information Report and Suggestion Sheet  
PQS DEVGRU AUTOVON 957-5367

DATE \_\_\_\_\_

City \_\_\_\_\_

ing Address \_\_\_\_\_

AUTOVON # \_\_\_\_\_

Standard Affected \_\_\_\_\_ NAVEDTRA # \_\_\_\_\_

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# \_\_\_\_\_

arks/Recommendations (Use additional sheets if necessary)

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